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(56) Documents Cited

GB 2232651 A GB 1393349 A WO 99/19583 A1

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(54) Abstract Title

**Positioning & fixing loads such as cladding panels**

(57) Apparatus for the positioning of a load 1 comprises a support 2 having a bearing surface 15, an elongate, movable carrier member 16 positionable to bear on the said bearing surface 15 with load-engagement means 19 thereof projecting beyond the said load-bearing surface and means 21 for counteracting the turning moment acting on the carrier member 16 when carrying the said load 1 by the said load-engagement means 19, whereby the position of the said load 1 is adjustable by varying the position of the carrier member 16 on the said bearing surface.

The load may be a building cladding panel and the means 19 a pin therefor. Preferably the counteracting means is a further support 21 loosely trapping the carrier 19. Fine adjustment of the height of the load is provided for by telescopic legs 8 and a jack 5 on the support 2. Preferably, the support(s) are carried on a boom or scissors lift to enable lifting or lowering. The apparatus can be used in pairs (Fig 2) and spare panels can be carried adjacent the apparatus (Fig 3). The load can be manually placed on the engaging means or raised thereto (Figs 4-6).

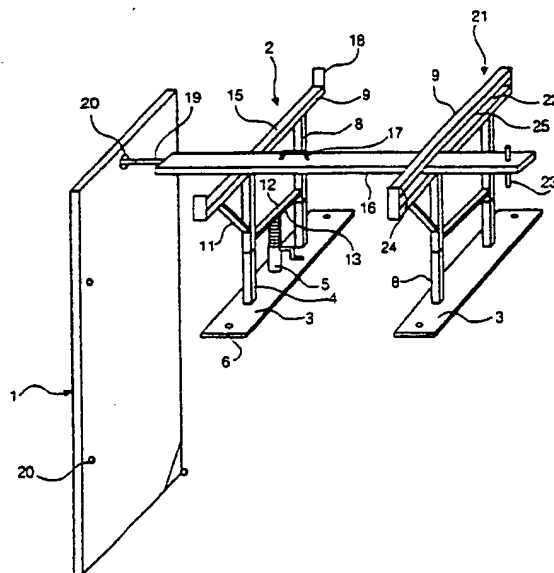


Fig. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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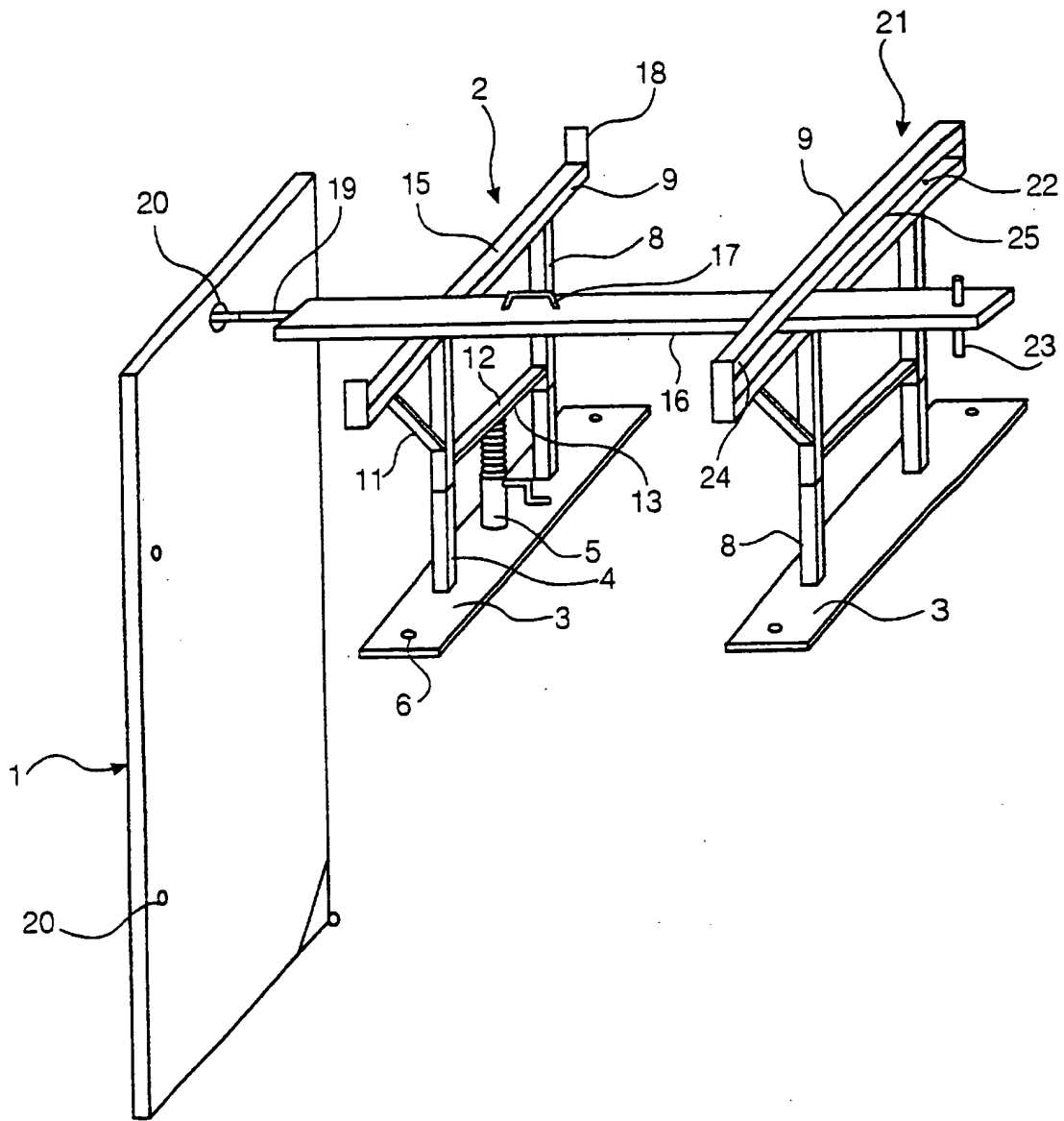


Fig. 1

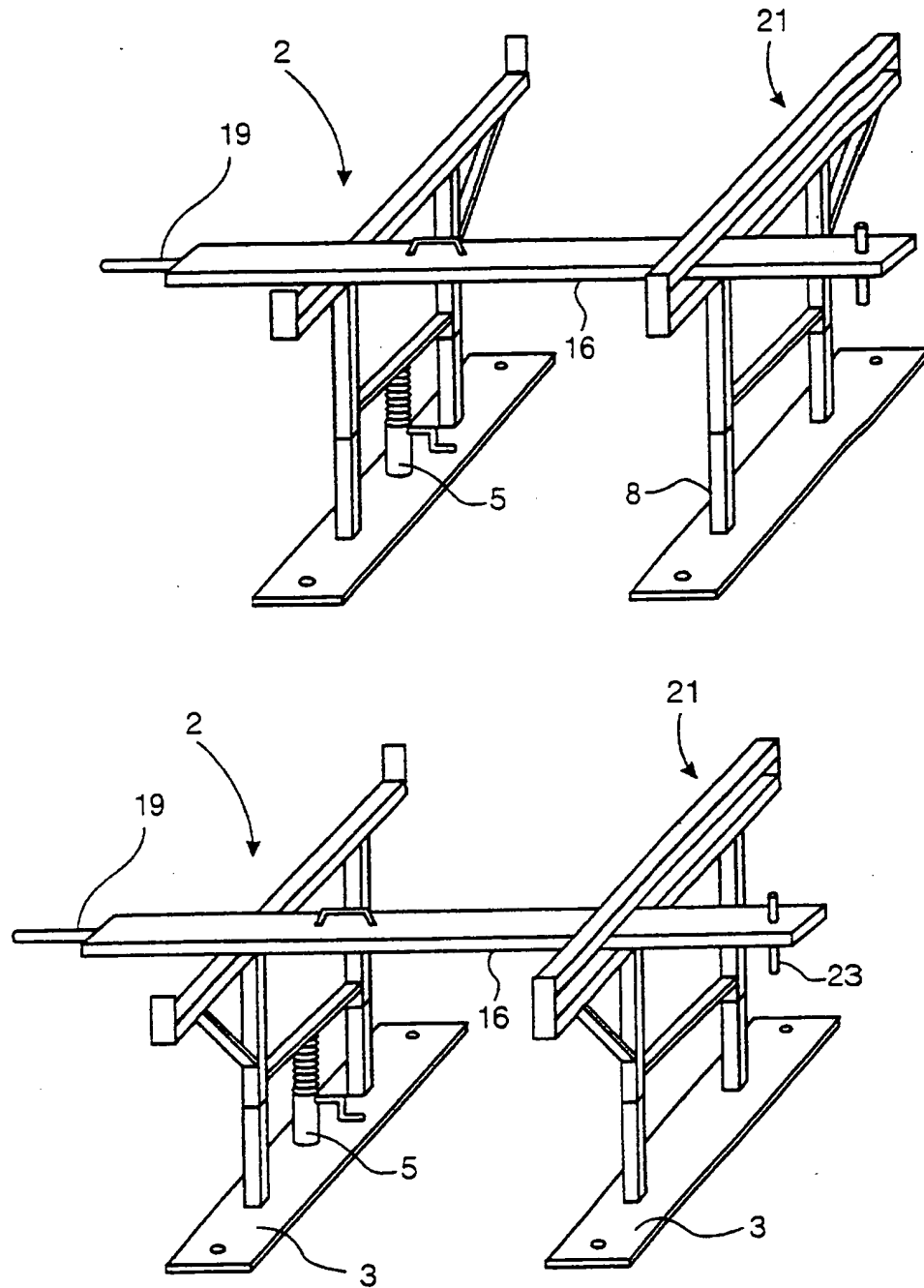


Fig. 2

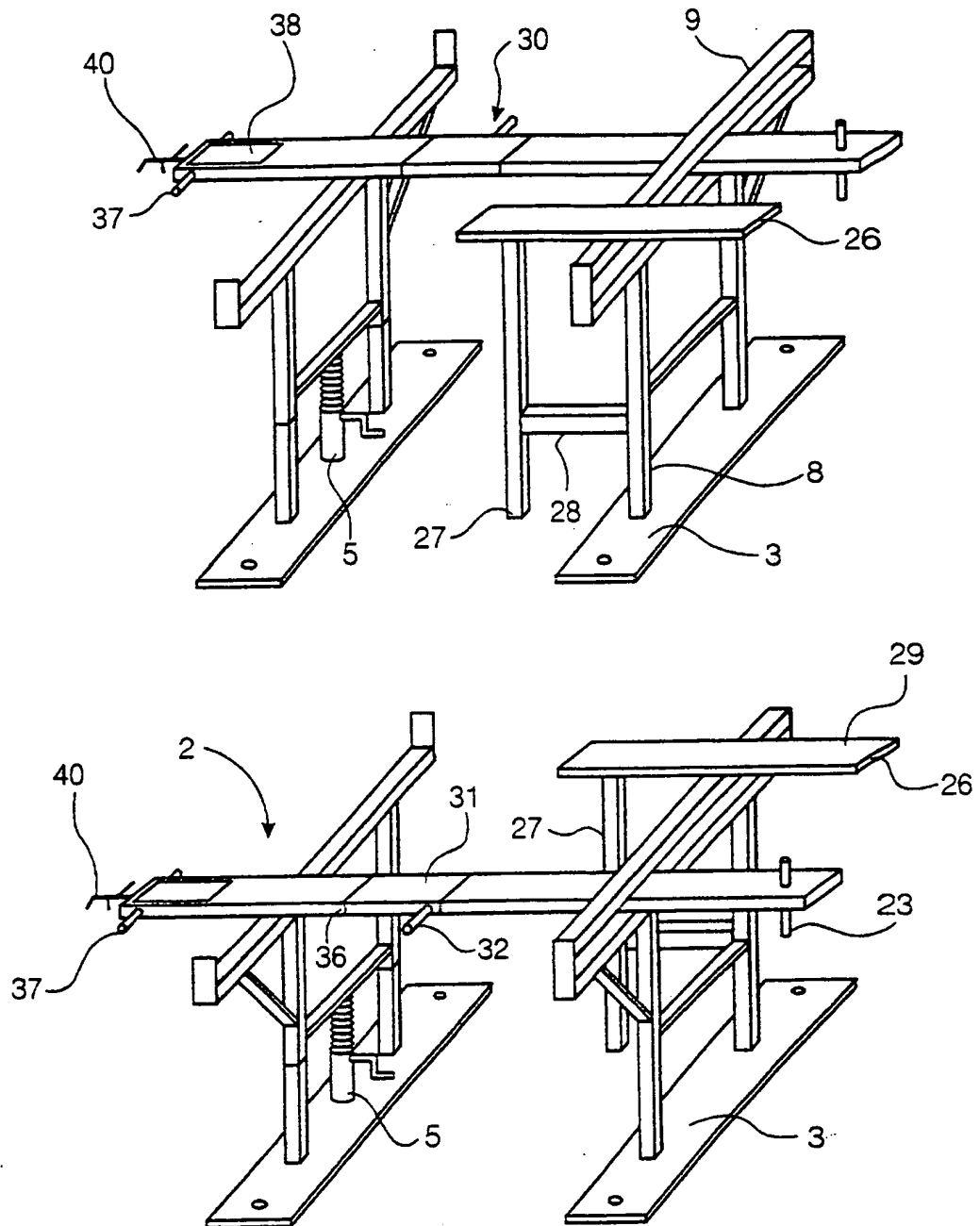


Fig. 3

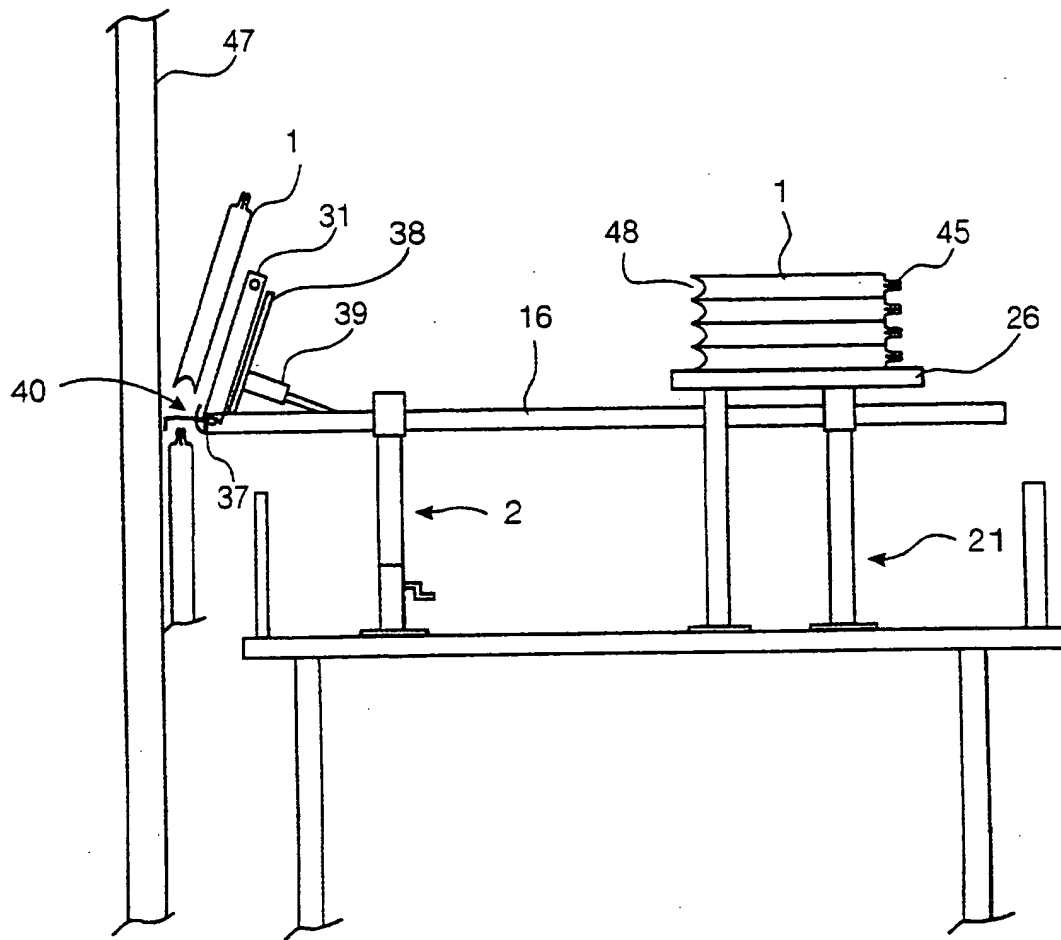


Fig. 4

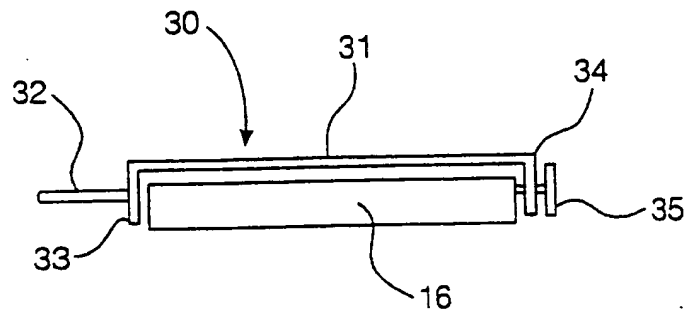


Fig. 5

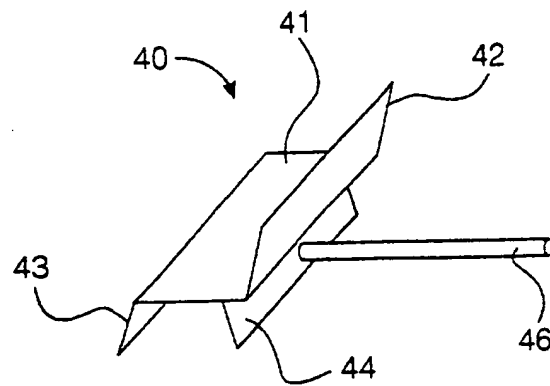


Fig. 6

## APPARATUS FOR POSITIONING A LOAD

The present invention is concerned with an apparatus for the positioning of a load, especially for the fine positioning of a load. The present invention is particularly, although not exclusively, concerned with the use of the apparatus for the fine positioning of awkward loads that are difficult to handle and need to be fixed into place at elevated positions.

10

The use of composite roof and wall cladding panels in the construction of buildings, especially those of an industrial nature, is an increasingly common feature of the modern landscape. Such cladding panels can offer considerable benefits in terms of appearance, weather resistance, fire resistance and sound reduction for a building and typically have very good heat insulating properties.

20 However, the placement of the cladding panels around the circumference of a building or its use as a roofing material is a difficult operation in spite of the interlocking (usually tongue and groove) provided on the cladding.

25

The difficulty essentially arises from the dimensions of the cladding panels manufactured and used - which makes handling by workmen a difficult and strenuous operation. The situation is not improved by the fact that often the  
5 surface of the cladding panel is corrugated and/or has a leather grain or similar grain finish making the use of vacuum suckers difficult or near impossible.

Although hand-held pincers or hook arrangements may be  
10 used as an aid to handling cladding panels they do not offer a satisfactory solution for accurate placement since the movement by workmen of a heavy load over short distances is typically jerky and complicated by susceptibility to fatigue-induced shake.

15

The problem is exaggerated when the dimensions of a building are such that cladding panels are to be placed from an elevated position. The placement, whether row upon row or column beside column then demands the use of  
20 a boom or scissor lift which restricts the area by which the load may be supported whilst still requiring controlled support with lifting and lowering by workmen into final position.

25 Such an operation is further complicated by the fact that



it is difficult to achieve the optimal height of scissor or boom lifts since they are difficult to operate so as to effect slight incremental changes in height or position. A situation therefore arises in which a number  
5 of workmen must support a hanging cladding panel at some distance and height from the wall or cage elements of the lift and then lift and move it from this hanging position so as properly to place it into a final position. Such a situation is highly unsafe and wearing on the workmen who  
10 may be forced to take shifts in order to rest before completion of the task in hand.

The present invention seeks to improve upon this situation and to offer the advantages of a speedier,  
15 safer and less strenuous operation in the placement of awkward loads whilst reducing the number of workmen required.

The present invention therefore provides apparatus for  
20 the positioning of a load, comprising a support having a bearing surface, an elongate, movable carrier member positionable to bear on the said bearing surface with load-engagement means thereof projecting beyond the said load-bearing surface and means for counteracting the  
25 turning moment acting on the carrier member when carrying

the said load by the said load-engagement means, whereby the position of the said load is adjustable by displacing the position of the carrier member on the said bearing surface.

5

In one embodiment of the invention the means for counteracting the turning moment comprises a further support providing a counteracting surface engageable by the said elongate carrier member whereby to resist  
10 rotation of the said elongate carrier member about said support.

In a preferred embodiment the apparatus of the present invention further comprises adjustment means for  
15 adjusting the vertical height of the said load-engagement means.

The apparatus of the present invention is advantageously used in conjunction with a vertically adjustable support  
20 platform. In one embodiment, therefore, there are provided fixing means for fixing the or each said support and/or the or each further support to a vertically adjustable support platform. In an alternative embodiment the said support or the said further support  
25 may be provided on or by a vertically adjustable support

platform.

Preferably the vertically adjustable support platform is part of or carried by a boom or scissor lift.

5

In one embodiment of the present invention the support and/or further support are fixed or integral to the extension trays, typically provided on a scissor lift.

- 10 Preferably the carrier member is cantilevered in the apparatus of the present invention. In this embodiment the range through which the carrier member is displaceable along the load-bearing surface when apparatus of adequate height is used within a scissor or
- 15 boom lift may be increased and the apparatus may be easily fixed or positioned so as to allow the load-bearing surface to extend over the extension tray and/or a wall or cage element of the lift.

- 20 In another embodiment the carrier member of the apparatus of the present invention is telescopically adjustable. In this embodiment the operator may choose the range through which the carrier member is displaceable across the load-bearing surface.

The vertical adjustment means of the apparatus of the present invention may comprise at least one telescopically adjustable leg provided by the support or further support. Preferably, however, the vertical  
5 adjustment means are provided by two telescopically adjustable legs provided by the support.

The vertical adjustment means may also comprise, singly or in any combination, pneumatic or hydraulic or screw  
10 thread adjustment means. Preferably, however, the vertical adjustment means comprise screw thread adjustment means such as those afforded by a lifting jack. In one embodiment of the present invention the vertical adjustment means are remotely operable.

15

Preferably the carrier member of the apparatus of the present invention is manually displaceable along and/or across the said bearing surface. In some embodiments there may be provided a positioning handle so as to  
20 facilitate this movement. In other embodiments the load-bearing surface and at least a part of the carrier member may offer reduced frictional interaction either by choice of appropriate materials or by lubrication.

25 In one embodiment of the present invention the elongate

movable carrier member is provided with means for positioning a load onto the said load engagement means. In this embodiment load may be moved supported by the carrier member while being moved towards the load engagement means. For this purpose a slide bracket may be provided on the upper surface of the load carrier member. The means for positioning the load may comprise or further comprise a tilting mechanism housed in a cavity in the carrier member.

10

In a further embodiment, the or each support and/or further support may include a load-bearing surface for support of the said load. In this embodiment the load may be temporarily stored in readiness for placing onto the load carrier member.

The load-engagement means of the apparatus of the present invention may comprise a pin for engagement in a hole in the load. Holes are typically provided in cladding panels to allow pincers or hooks to engage them. Of course, such pincers or hooks may be provided as the load-engagement means although it is preferred that a pin be used for this purpose, which pin is preferably provided with a notch or groove for engagement through the width of the contacting cladding panel.

Alternatively, the load-engagement means may comprise a holding tool for holding at least a part of the load in position at the end of the carrier member.

5

In a particularly preferred embodiment, the load engagement means is detachable from the carrier member. In this embodiment the load engagement means is easily replaced if it is damaged due to wear or accident.

10

An aspect of the present invention includes a kit of parts for assembling the apparatus of the invention. The kit of parts may provide a load-bearing support, an elongate movable carrier member having load engagement means and means for counteracting the turning moment acting on the carrier member when carrying a load by the the load engagement means.

A further aspect of the present invention includes the use of the apparatus or the kit of parts according to the invention in a method of positioning and/or fixing a load in or to an elevated position.

The apparatus of the present invention is advantageously used in a method of fine positioning and/or fixing a load

in or to an elevated position.

The present invention also provides a method of positioning and/or fixing composite cladding or panel to the outer or inner circumference or the roof of a building.

The present invention therefore provides significant advantages in that loads which are difficult to handle loads, such as cladding panels, can be accurately positioned without excessive lifting by workmen.

Various embodiments of the present invention will now be described by way of non-limiting example with reference to the following drawings in which:

Figure 1 is an isometric view of a first embodiment for the vertical placement of composite cladding or panel;

Figure 2 is an isometric view of a second embodiment useful in the horizontal placement of composite cladding or panel;

Figure 3 is an isometric view of a third embodiment of the present invention, similar to that of Figure 2;

Figure 4 is a side view of the embodiment of Figure 3 in use;

Figure 5 is a side view of the traveller of Figure 3; and

Figure 6 is a perspective view of the positioning tool of Figure 4.

5

Referring now to Figure 1 of the drawings, a support, generally designated 2, for supporting composite cladding or panel 1 on a scissor lift, comprises a base plate 3 having two upstanding and co-linear hollow columns 4 of equal height. A jack 5 is optionally fixed to base plate 3 so that the jack is centrally and co-linearly located between columns 4. Alternatively jack 5 may be there positioned prior to the use of the apparatus. Base plate 3 has apertures 6 for receipt of screws for fixing the base plate to the main part of or to the extension trays of a scissor lift.

Columns 4 on base plate 3 are suitable for receipt of legs from the posts 8 of a trestle, generally designated 7. A cross-beam 9 of greater length than the length between posts 8 is fixed across the top thereof so as to define a continuous upper face 10 there across and somewhat beyond. The cross-beam 9 is further supported by strut 11 fixed to post 8 and cross-beam 9. The framework is strengthened by a lower transverse beam 12



fixed between posts 8. The lower surface 13 of transverse beam 12 provides a contacting surface for the screw 14 of jack 5. The upper surface 15 of cross-beam 9 provides a contacting surface for a load supporting member 16. Although load supporting beam 16 is shown as substantially planar it is by no means limited in this respect and may instead be substantially box square or cylindrical.

Carrier member or load support beam 16 is provided with a positioning handle 17 to aid displacement across the upper surface 15 of cross-beam 9. Cross-beam 9 is provided with walls 18 upstanding from upper surface 15 so as to prevent support beam 16 from travelling off the trestle. Load support beam 16 is equipped, at a proximal end, with a pin 19 of an appropriate size for engagement in holes 20 provided in cladding or panel 1.

The apparatus includes a further support, generally designated 21. Support 21 is at least of similar width and of similar design to support 2 (thus like elements will be numbered according). Support 21 is provided by a trestle 7 comprising posts 8, cross-beam 9, strut 11 and transverse beam 12. However support 21 is intended to be of greater height than support 2. Thus posts 8 are of

greater length than in support 2 and are also non-detachably fixed to or made integral to a base plate 3. Cross-beam 9 of support 21, of similar width to that of support 2, is optimally formed from a substantially heavier material. Further cross-beam 9 is now provided with a slot 22 extending along the major part of its width and of sufficient height to receive load support beam 16. Load support beam 16 is equipped, at a distal end, with cross-pins 23 intended to prevent load support beam 16 from slipping out of slot 22. The lower surface 25 of upper member 24 of slot 22 therefore provides a counteracting surface that prevents rotation of the load support beam 16 about support 2 under the influence of a load.

15

This embodiment may be used on a scissor lift for the placement of cladding panels. For this, the operator, having determined on vertical placement, will adjust the scissor lift so as to allow deployment of the extension trays in a direction perpendicular to the surface to be covered. The operator may then fix base plate 3 of support 2 and support 21 on the main part of the lift or on respective extension trays. Support 2 and support 21 will preferably be placed so that they are substantially parallel with respect to each other and the shortest

25

length of the wall or cage element on the lift. In the completed assembly of this configuration, and provided their heights allow, cross-beams 9 may extend across the whole of the width of the lift. In order to complete the  
5 assembly the operator will first place the legs of trestle 7 in columns 4 on base plate 3 and having constructed support 2, the proximal end of load support beam 16 is threaded through slot 22 of cross-beam 9 of support 21 and brought to rest at least on the upper  
10 surface 15 of cross-beam 9 on support 2. Of course it will be understood that positioning handle 17 will be configured so as not to prevent this operation when the load support beam 16 cannot be rotated within the slot 22. Jack 5 can arranged so as to exert a slight upward  
15 force between the base plate 3 and transverse beam 12 on support 2. The apparatus is now ready for the engagement of the cladding panel.

The cladding panel is orientated on the ground so that  
20 its greater length is parallel to the wall or cage element of the lift and if necessary lifted by workmen to thread pin 19 through hole 20 provided in the top edge of the cladding panel. The scissor lift is then operated so as to begin to raise one end of the cladding panel away  
25 from the ground. The lifting process may be facilitated

by guide means in the form of a wheel-bearing corner sleeve for the cladding panel although often manual supervision by workmen on the ground will suffice. Once the cladding panel is off the ground and vertically  
5 aligned close to the surface to be covered the scissor lift is operated to deliver the cladding panel to a position approximately level to or above the point to which it is to be attached. At this position the jack may be engaged to raise the position of the load support  
10 beam 16 by the vertical adjustment of the height of cross-beam 9. Thus a tongue provided in the cladding or panel is positioned to a point of vertical height just above the slot provided in another. Meanwhile the positioning handle 17 is operated to displace the load  
15 support beam 16 along and/or across the upper surface 15 of cross-beam 9 and provide an alignment of tongue and slot with respect to longitudinal and lateral position. Finally the jack is again engaged to drop the vertical height of cross-beam 19 and lower, tongue into slot. Pin  
20 19 may now be disengaged from hole 20, and if necessary by further operation of the jack. The final placement may be then secured by exertion of a downward pressure on the upper edge of the cladding or panel by the workmen.

25 Referring now to Figure 2 of the drawings an arrangement

for the placement of composite cladding or panel in rows consists of a parallel arrangement of two supports 2 and two supports 21 each pair having therewith a load support beam 16. In this configuration the operator, having  
5 determined on horizontal placement (not shown), will configure the scissor lift so as to allow deployment of the extension trays in a direction parallel to the surface to be covered. The operator may then fix base plate 3 of each support 2 and each support 21 on the main  
10 part of the lift or the respective extension trays. Supports 2 and supports 21 will preferably be placed so that they are substantially parallel with respect to each other and the longest length of the wall or cage element on the lift. It will be noted that in the completed  
15 assembly each pair of supports 2 or 21 is outwardly facing from each other so as to allow the maximum range across which the load may moved. The assembly is completed in exactly the same way for each pair of supports as described for the first embodiment.

20

The cladding panel 1 is then orientated on the ground so that its greater length is parallel to the wall or cage element of the lift pins 19 threaded through holes 20  
provided in the lateral edge of the cladding panel (not  
25 shown). The scissor lift is then operated so as to raise

the cladding panel to a position approximately level to or above the point to which it is to be attached. The process of horizontal placement is continued in a similar way to that previously described. Of course it will  
5 realised that operation of jacks 5 are preferably conducted at the same time in this later process.

Referring now to Figure 3 of the drawings, another arrangement, similar to that of Figure 2, allows  
10 horizontal positioning with temporary storage of a plurality of cladding panels 1 on the scissor or boom lift.

Thus, supports 21 are each provided with a fixed, load  
15 support beam 26. Support beams 26, which traverse cross beams 9 in a directional perpendicular thereto, are each fixed to an additional vertical post 27 positioned, in the gap between the two support assemblies 21, in parallel with the posts 8 located towards the inwardly  
20 facing ends between each support 21. A rail 28, parallel to support beam 26, reinforces the framework by connecting vertical posts 27 with posts 8 of each support. In this embodiment support beams 26, vertical posts 27 and rails 28 are removably attached by bolting  
25 to each other, to the supports 21 and to the floor of the

scissor or boom lift, as the case may be.

Load support beams 26 provide upper surfaces 29 which are of sufficient longitudinal and lateral dimension  
5 adequately to support a number of cladding panels spanning the gap between the two support assemblies 21 whilst, at the same time, allowing the operator to move the cladding panel 1 onto the load-support beam 16.

10 The load support beam 16 according to this embodiment is equipped with a number of additional features to the embodiment shown in Figure 2. In particular, the handle 17 provided on support beam 16 is replaced with a traveller, generally designated 30, for moving the  
15 cladding or panel 1 along the support beam. Referring also to Figure 5, the traveller 30 consists of a, generally U-shaped, slide bracket 31 which is dimensioned so as to fit snugly over a portion of the upper half of the load support beam 16. The slide bracket 31, is  
20 provided with a handle 32 welded for example to its outwardly facing limb 33 (with reference to Figure 3). The opposite, inwardly facing limb 34 of slide bracket 31 is provided with a threaded hole for receipt of a threaded fixing pin 35 which can engage the load-support  
25 beam 16 so as to lock the relative position of the slide

bracket 31 thereon.

A recess 36, provided in each limb 33, 34 at the proximal or working end of slide bracket 31, allows the slide  
5 bracket 31 to pivot on a pin 37 extending from each of the outwardly facing and inwardly facing surfaces at the proximal end of the load support 16.

The pivot action of the slide bracket 31 is initiated by  
10 a tilt plate 38 (See Figure 4) located in the upper surface 15 towards the proximal end of the load support beam 16 which contacts the underside of the slide bracket when pins 37 are engaged. The tilt plate 38, is tilted by an automated pneumatic or hydraulic piston mechanism  
15 39 which is housed within a cavity provided in the load support beam 16. In this embodiment the mechanism carries its own power supply and is actuated by switching means engaged by the operator. In other embodiments the mechanism includes sensing means linked to the switching  
20 means.

Referring now to Figures 3 and 6, pin 19 at the proximal end of each load support beam is replaced with a holding tool, generally designated 40, allowing controlled  
25 positioning of the cladding panel 1 on a building wall



for engagement with other such cladding panels.

Holding or positioning tool 40 consists of an elongate plate member 41 provided with an upwardly extending wall 42 along one longitudinal edge and a downwardly projecting wall 43 along its opposite longitudinal edge.

A flange or rib member 44, also depends downward at a position inward from the longitudinal edge along the length of the lower surface of plate member 41. Wall 43 and rib member 44, which each diverge downwardly are dimensioned so as to engage the outer surfaces of the tongue elements 45 of the cladding panel 1 allowing the plate member 41 to provide a support surface spanning the thickness thereof for the next cladding panel 1 to be fitted. Upwardly projecting wall 42 is dimensioned so as to provide a barrier to slippage of the additional cladding or panel 1. The positioning tool 40, which may be largely pressed from sheet metal, is provided with an attachment rod 46 for attachment to the load support beam 16. In this embodiment the proximal end of the rod 46 is welded to an outer surface of rib member 44 and its distal end attached by fixing pins within a block made of hardened steel provided in a slot formed in the support beam 16.

Having regard now to Figure 4, at the beginning of the operation, the scissor or boom lift is positioned alongside the wall to be covered and loaded with a number of cladding panels 1 on the auxiliary support members 26  
5 spanning the gap between supports 21. The scissor or boom lift is then elevated to the required height against the building wall 47 and the load support beam 16 is positioned with its proximal end and positioning tool 40 above the tongue elements 45 of a cladding panel 1  
10 already fixed to the wall 47, using the handle 33 provided on the locked slide bracket 31 and jacks 5 provided with each support 2.

Once the load support beam 16 is positioned, the jack 5  
15 is operated to lower the inside surfaces of wall 43 and rib member 44 of the positioning tool 40 over the outside surfaces of tongue elements 45 of cladding or panel 1.

A cladding panel 1 is then moved from the pile supported  
20 by beams 26 onto the slide bracket 31 provided on support beam 16. The fixing pin 35 is slackened and the slide bracket 31 and cladding panel 1 moved along the support beam 16 by the operators so that recesses 36 in the slide bracket 31 engage pins 37. The operators then engage the  
25 tilt mechanism which tilts the slide bracket 31 and the

cladding panel 1 onto the positioning tool 40 and against the wall 47. If necessary the operators manually assist the cladding panel past the guide wall 42 and maintain the cladding panel 1 against the wall 47. The tilt  
5 mechanism 38 is reversed and the slide bracket 31 returned and fixed at a position towards the distal end of the load support beam 16. The jack 5 is operated to lift the support beam 16 a small distance and disengage the wall 43 and rib member 44 of holding or positioning  
10 tool 40 from the tongue elements 45. The holding or positioning tool 40 is then moved from between the cladding panel 1 and the underlying previously fixed panel by withdrawing the support beam 16 away from the wall 47 using handle 32 on locked slide bracket 31. The  
15 operators then assist the tongue elements 45 to engage into the groove 48 provided in the introduced cladding panel 1 and fix the cladding panel 1 to the wall 47 by pins (not shown) provided in apertures 20.

20 The use of the positioning tool 39, although not essential, is advantageous in the present invention in that it reduces the risk of the cladding panel 1 slipping from a position in which it is partially or incompletely supported by the tongue elements 45 of other cladding  
25 panel 1. Further, the engagement of wall 43 and rib

member 44 over the tongue elements 45 at least reduces, if not eliminates the effects of sway in the scissor or boom lift which might otherwise lead to the support beam 16 moving away from the wall 47. In effect, the support  
5 beam 16 is held stationary in the event of scissor or boom lift sway with the upper surface 15 of cross beam 9 slipping underneath the lower surface of the support beam 16.

10 Although the apparatus is preferably made from steel any appropriate material may be used. The pin 19 may extend through the longitudinal length of the support beam 16 or may too form part of a block positioned in the support beam 16. Hooks, ropes or pincers may be attached to the  
15 pin to support or secure the load. The support beam itself may be hollow or part hollow. The jack may alternatively be fixed to a transverse beam provided between columns 4 on base plate 3 rather than the floor of the base plate 3.

## CLAIMS

1. Apparatus for the positioning of a load, comprising  
a support having a bearing surface, an elongate, movable  
5 carrier member positionable to bear on the said bearing  
surface with load-engagement means thereof projecting  
beyond the said load-bearing surface and means for  
counteracting the turning moment acting on the carrier  
member when carrying the said load by the said load-  
10 engagement means, whereby the position of the said load  
is adjustable by varying the position of the carrier  
member on the said bearing surface.

2. Apparatus according to Claim 1, in which the said  
15 means for counteracting the turning moment comprises a  
further support providing a counteracting surface  
engageable by the said elongate carrier member whereby to  
resist turning of the said elongate carrier member about  
said support under the action of the load.

20

3. Apparatus according to Claim 1 or Claim 2, further  
comprising adjustment means for adjusting the height of  
the said load-engagement means.

25 4. Apparatus according to Claim 1 to 3, in which the or

each said support and/or further support form part of, or are attachable, to a support platform the height of which is adjustable.

5 5. Apparatus according to Claim 4, in which the said support platform is part of or carried by a boom or scissor lift.

6. Apparatus according to Claim 5, in which the support  
10 or supports are fixed or integral to extension trays provided on said scissor lift.

7. Apparatus according to any preceding Claim, in which the said elongate, movable carrier member is  
15 cantilevered.

8. Apparatus according to Claim 3 to 7, in which the said adjustment means comprise at least one telescopically adjustable leg of said support or said  
20 further support.

9. Apparatus according to Claims 3 to 8, in which the said adjustment means comprise pneumatic and/or hydraulic and/or screw thread adjustment means.

10. Apparatus according to Claims 3 to 9, in which the said adjustment means is remotely operable.

11. Apparatus according to any preceding Claim, in which  
5 said elongate movable carrier member has a positioning handle for use in effecting movement of said elongate member.

12. Apparatus according to any preceding Claim, in which  
10 said elongate, movable carrier member is telescopically adjustable.

13. Apparatus according to any preceding Claim, in which said elongate movable carrier member has means for  
15 positioning a load onto the said load-engagement means.

14. Apparatus according to any preceding Claim, in which said load-engagement means comprise a pin for engagement in a hole in said load or a holding tool holding at least  
20 a portion of said load.

15. A kit of parts for assembling the apparatus of any preceding claim comprising the said load-bearing support, the said elongate movable carrier member having load-  
25 engagement means and the said means for counteracting the

turning moment acting on the carrier member when carrying  
a load by the said load-engagement means.

16. Apparatus substantially as hereinbefore described,  
5 with reference to, and as shown in the accompanying  
drawings.

17. Use of the apparatus or kit of any preceding claim,  
in a method of positioning and/or fixing a load in or to  
10 an elevated position.

18. Use according to Claim 17, in a method of  
positioning and/or fixing a composite cladding panel to  
an outside or inside wall of a building.





Application No: GB 0105602.7  
Claims searched: 1-18

Examiner: Dave McMunn  
Date of search: 8 May 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.S): B8B (BGA, BGB, BGC, BGD, BGG, BGX). B8J. E1S (SAV).  
Int Cl (Ed.7): E04G 21/16.  
Other: ONLINE : WPI, EPODOC, JAPIO.

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2,232,651 A (VALUE CONTROL). See Figs & note counterweight 17	1,3,12,15
X	GB 1,393,349 (PYE). See Figs & note counterweight 19	1,3,12,15
X	WO 99/19583 A1 (INKEROINEN). See Figs 11-15	1,3-5, 12,15,17, 18

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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